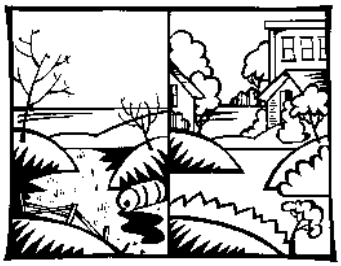
Fact Sheet



Ecological Risk Assessment for the Contaminated Harbor Sediments at the Ashland/Northern States Power Lakefront Site

Background

The Ashland/NSP Lakefront Site consists of several properties, and about 10 acres of the sediment and surface waters in Chequamegon Bay. The Site has a long history of industrial use, dating back to the turn of the Century (for more background information on the site, please see *A History of the Ashland/Northern States Power Lakefront Site*, DNR Fact Sheet #RR-645).

In 1996, as part of an ongoing investigation of the Ashland/Northern States Power (NSP) Lakefront Site, sediment samples were obtained from 80 different locations in the Ashland harbor. The samples were taken by Short Elliott Hendrickson (SEH), Inc., under contract with the Wisconsin Department of Natural Resources (DNR).

Based on data from previous investigations, samples were analyzed for polycyclic aromatic hydrocarbons (PAHs), volatile organic compounds (VOCs), metals, cyanide, sulfide, and/or total organic carbon. Certain samples were also analyzed for the total number of microorganisms present.

This investigation documented that the contaminated sediments are located directly offshore from Kreher Park, and are bounded to the east and west by historic docks that act as breakwaters.

The analytical data identified concentrations of PAHs in the sediments ranging from a non-detectable level to 3,687 parts per million (ppm). Concentrations of VOCs range from a non-detectable level to 1,756 ppm. Tars and oils existing as free products were also present. "Free product" is separate, floating, or sinking material that does not readily mix or dissolve with water.

The contaminants are most concentrated at the interface of a wood waste layer that covers much of the area to an average depth of nine inches, and the underlying 10 feet of the sandy sediments. The contamination decreases with depth down to underlying subsoil materials.

Ecological Risk Assessment Process

Based on the results of the 1996 sediment investigation, the DNR concluded that a baseline ecological risk assessment was needed. The assessment would estimate the current and future risks from contaminants to aquatic organisms, fish, birds and wildlife that may use the sediments and water as part of their habitat.

The DNR contracted with SEH (in cooperation with the Lake Superior Research Institute) to complete an Ecological Risk Assessment in October 1998. The assessments followed guidance developed by U.S. EPA.

The assessment used multiple methods for evaluating the potential affects on different organisms exposed to contaminants through several exposure routes. This approach was chosen to provide a more complete picture of the overall ecological impacts.

Based on the results from the 1996 sampling, SEH gathered additional samples to complete the assessment. In January/February 1998, a total of 10 sediment samples from the upper 6-9 inches of sediment and 12 water column samples were collected within the same study area as in 1996.

The samples were analyzed for PAHs, VOCs, ammonia, sulfide, and/or total organic carbon. The sediment samples were also observed for the presence, diversity and concentration of benthic or "bottom dwelling" organisms (e.g., worms crustaceans, insects, etc).

In May 1998, four additional sediment samples were collected. Two samples were located within the area of contaminated sediments and two samples were located outside the contaminated area. The samples were collected from the top 15 inches of sediment.

Water column testing was performed at one location during a period of relatively high wave action.

The data gathered during the 1998 sampling were evaluated by four methods, including:

1) comparing the contaminant concentrations to the results of similar studies conducted at other sediment sites;
2) comparing contaminant concentrations with published guidelines or criteria in order to assess the potential effects on fish and other aquatic organisms;
3) comparing the number and diversity of organisms present in the contaminated sediments with those found in uncontaminated samples; and
4) performing laboratory toxicity testing using various organisms such as worms, crustaceans, insects and fathead minnows. This testing consisted of exposing these organisms to contaminated sediments and water, as well as to sediments and water collected outside the area of contamination.

Ecological Risk Assessment Results

The major results of the Ecological Risk Assessment include:

- concentrations of one or more PAH compounds exceeded ecological risk screening levels; these nationally-recognized levels were established by the National Oceanic and Atmospheric Administration (NOAA) and the Province of Ontario, Canada;

- no PAHs and only one VOC compound (benzene) were detected in the 12 water column samples taken in January/February, 1998;

- 12 PAHs and four VOCs were detected in a sample taken from one foot above the water/sediment interface during 2-3 foot waves in May, 1998; one PAH, benzo(a)pyrene, exceeded screening guidelines for acute toxicity and one PAH, benzo(a)anthracene, exceeded screening guidelines for chronic toxicity;

- the number and diversity of bottom-dwelling organisms in samples of contaminated sediment are generally less than those present in samples taken from outside the contaminated area;

- the survival of bottom-dwelling organisms was less in contaminated sediment samples when compared to samples taken from outside the contaminated area;

- the survival of fathead minnows was less in water exposed to contaminated sediment compared to water exposed to samples taken from outside the contaminated area; and

- the survival of worms, insects and fathead minnows exposed to PAH-contaminated water was reduced when subsequently exposed to ultraviolet light (i.e. sunlight), which can make PAH's more toxic.

Follow Up Analysis

The site is currently proposed for the National Priority List (NPL) as part of the federal Super fund program. As part of this effort, DNR staff requested that EPA's Ecological Risk Assessment staff review the existing information and provide comments. Based on their review, EPA felt additional analysis was necessary. The DNR again contracted with SEH and the Lake Superior Institute to complete a supplemental investigation and testing program. Additional samples were collected in March, 2001, and are currently undergoing analysis.

For More Information

To see the complete Ecological Risk Assessment or other official documents and records for this site, please visit the following locations:

Vaughn Public Library
502 W. Main St.
Ashland, WI 54806
715-682-7060

Sigurd Olson Environmental Institute
Northland College
1411 Ellis Avenue
Ashland, WI 54806
715-682-1223

Contacts

Sigurd Olson Environmental Institute:
Kenneth Bro, Executive Director, 715-682-1223
kbro@northland.edu

Ashland County Health Department:
Judy Hitchcock, 715-682-7028
jhitchco@dockernet.com

DNR, Northern Region:
Jamie Dunn, Project Manager, 715-635-4049
dunnj@dnr.state.wi.us

Department of Health and Family Services: Henry Nehls-Lowe, Division of Health,
608-266-3479, nehlshl@dhfs.state.wi.us